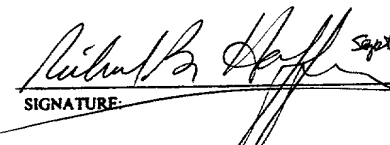


FORM 210-1390 (REV. 11-98)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTORNEY'S DOCKET NUMBER PA 29584
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371			U.S. APPLICATION NO. (If known, see 37 CFR 1.5) 09/623865
INTERNATIONAL APPLICATION NO. PCT/EP99/00217	INTERNATIONAL FILING DATE January 15, 1999	PRIORITY DATE CLAIMED March 10, 1998	
TITLE OF INVENTION METHOD FOR PRODUCING A RIM HOLE			
APPLICANT(S) FOR DO/EO/US Otto Plank			
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:			
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input type="checkbox"/> This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).</p> <p>4. <input checked="" type="checkbox"/> A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p>a. <input checked="" type="checkbox"/> is transmitted herewith (required only if not transmitted by the International Bureau).</p> <p>b. <input type="checkbox"/> has been transmitted by the International Bureau.</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input type="checkbox"/> A translation of the International Application into English (35 U.S.C. 371(c)(2)).</p> <p>7. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>a. <input type="checkbox"/> are transmitted herewith (required only if not transmitted by the International Bureau).</p> <p>b. <input type="checkbox"/> have been transmitted by the International Bureau.</p> <p>c. <input checked="" type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input checked="" type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). In Blank</p> <p>10. <input type="checkbox"/> A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p>Items 11. to 16. below concern document(s) or information included:</p> <p>11. <input type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>14. <input type="checkbox"/> A substitute specification.</p> <p>15. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>16. <input checked="" type="checkbox"/> Other items or information:</p>			
PCT Publication W099/46069 PCT Form 210 PCT Form 308 in duplicate (one with receipt stamp) PCT Form 401 PCT Form 101 General Authorization Return Postcard		<p>"Express Mail" mailing label number EL024103075US Date of Deposit September 6, 2000 I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231</p> <p>Marie Lentz (Typed or printed name of person mailing paper or fee)</p> <p><i>Marie Lentz</i> (Signature of person mailing paper or fee)</p>	

U.S. APPLICATION NO. (if known, see 37 CFR 1.51)		INTERNATIONAL APPLICATION NO.		ATTORNEY'S DOCKET NUMBER	
09/623865		PCT/EP99/00217		PA 29584	
17. <input checked="" type="checkbox"/> The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO. \$970.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO. \$840.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO. \$760.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4). \$670.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4). \$96.00 ENTER APPROPRIATE BASIC FEE AMOUNT = \$ 840.00				CALCULATIONS PTO USE ONLY	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	24 - 20 =	4	X \$18.00	\$ 72.00	
Independent claims	1 - 3 =	0	X \$78.00	\$	
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$260.00	\$ 260.00	
TOTAL OF ABOVE CALCULATIONS =				\$1,172.00	
Reduction of 1/2 for filing by small entity, if applicable. A Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28).				\$	
SUBTOTAL =				\$1,172.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$	
TOTAL NATIONAL FEE =				\$1,172.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property				+	
TOTAL FEES ENCLOSED =				\$1,172.00	
				Amount to be:	\$
				refunded	
				charged	\$
a. <input checked="" type="checkbox"/> A check in the amount of \$ 1,172.00 to cover the above fees is enclosed.					
b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.					
c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 20-1111. A duplicate copy of this sheet is enclosed.					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO: Richard B. Hoffman Tilton, Fallon, Lungmus & Chestnut 100 South Wacker Drive, Suite 960 Chicago, Illinois 60606 Telephone: 312/456-8000 Telecopy: 312/456-7776					
				SIGNATURE: 	
				NAME Richard B. Hoffman	
				26.910	
				REGISTRATION NUMBER	

09/623865

533 Rec'd PCT/PTO 06 SEP 2000

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Otto Plank) International Appln. No.
Serial No.) PCT/EP99/00217
Filed:) Filed: January 15, 1999
Title: METHOD FOR PRODUCING A)
RIM HOLE)
"Express Mail" mailing label number EL024103075US
Date of Deposit September 6, 2000
I hereby certify that this paper or fee is being
deposited with the United States Postal Service
"Express Mail Post Office to Addressee" service
under 37 CFR 1.10 on the date indicated above
and is addressed to the Commissioner of Patents
and Trademarks, Washington, D.C. 20231

PRELIMINARY AMENDMENT

Marie Lentz

(Typed or printed name of person mailing paper or fee)

Marie Lentz
(Signature of person mailing paper or fee)

Hon. Commissioner of Patents
and Trademarks
Washington, D.C. 20231

Sir:

In connection with the subject patent application,
please enter the following amendment.

IN THE SPECIFICATION:

Page 1, in the Title, please capitalize the letter p in
the word "producing", the letter r in "rim", and the letter h in
"hole";

Page 1, after the title, please add a centered heading
as follows: --Field of the Invention--;

Page 1, after the first full paragraph, please insert a
new centered heading as follows: --Background of the
Invention--;

Page 1, line 1, after "hole", please insert --or
eyelet--.

Page 2, line 7, after the word "usage", please insert a
--,--;

Page 2, after first full paragraph, please add a new centered heading as follows: --Summary of the Invention--;

Page 2, at lines 17, 20, 24, 26 (two occurrences), and 28, please eliminate the space between the words "work piece".

Page 3, at lines 12, 16 with carryover to line 17, 18, and 20, please eliminate the space between the words "work piece".

Page 4, after fourth full paragraph, please insert a new centered heading as follows: --Brief Description of the Drawings--.

Page 5, after line 16, please insert a new centered heading as follows: --Detailed Description of the Preferred Embodiment--;

Page 5, lines 18, 19 and 21, please eliminate the space between the words "work piece".

Page 6, lines 1, 3, 13, 15, 17 and carryover to line 18, including another occurrence at line 18, 19 (two occurrences with carryover to line 20), 21, 25, and 27, please eliminate the space between the words "work piece";

Page 6, line 26, please delete "centre" and substitute --center--.

Page 7, lines 2, 4, 13, 16, 23 and 24, please eliminate the space between the words "work piece".

Page 8, lines 6 (two occurrences), 7 and 8, please eliminate the space between the words "work piece".

IN THE CLAIMS:

At line 1, delete "Patent Claims", and substitute --I Claim:--.

Please amend the claims as follows:

1 (Amended). Method for producing a rim hole through a [pile] stack of at least two plate-shaped work[]pieces of the type using [in which by means of] a rim hole punch, essentially driven vertically through the pile, by which material of the one plate-shaped work[]piece facing the rim hole punch is pushed through an opening of the other plate-shaped work[]piece whereby the inside contours of the opening essentially correspond to the outer contours of the rim hole, [characterised in that] comprising the steps of forming, in a single feed movement of the rim hole punch (7), both the rim hole (9) as well as the opening (21) in the other, rear plate-shaped work[]piece (2) seen from the direction of feed, [are formed] by having the plate-shaped work[]piece (2) pointing away from the rim hole punch supported by a matrix (8), and breaking out, [such that] when the rim hole punch is driven through the [pile] stack (1, 2), a piece of material (10) [is broken out] of the rear plate-shaped work[]piece (2) [and whose] the outer contours of which piece of material essentially correspond to the outer contours of the rim hole.

2 (Amended). Method for producing a rim hole according to Claim 1, [characterised in that] wherein at the end of the feed movement of the rim hole punch (7), the rim hole (9)

protrudes over the surface facing matrix (8) of the rear plate-shaped work[]piece (2).

3 (Amended). Method for producing a [riveted joint] rim hole according to Claim 2, and the step of flanging [characterised in that] the rim hole (7) [is preferably flanged by] means of a flange punch (12) fed from a side of the workpieces opposite the rim hole punch, whereby, after flanging, the outer surface (14) of the rim hole rests, at least in some sections, on the outer surface (15) of the rear workpiece.

4 (Amended). Method for producing a rim hole according to [one of the above cited claims, characterised in that prior to formation of the rim hole] Claim 1, and the step of creating a penetration opening (3, 3'), prior to formation of the rim hole, [is created] through the pile (1, 2) and [whose] where the cross-section surface for such penetration opening corresponds at most to the cross-section surface of the opening (50, 51) of the rim hole.

5 (Amended). Method for producing a rim hole according to [one of the above cited claims, characterised in that] Claim 4, and wherein the penetration opening (3, 3') is created through the pile (1, 2) with an essentially constant cross-section.

6 (Amended). Method for producing a rim hole according to [one of the above cited claims, characterised in that] Claim 4, and wherein the penetration opening (3, 3') is created with the feed movement of the rim hole punch by means of the rim hole

punch (7) and by which the rim hole (9) and the piece of material (10) are formed.

IN THE ABSTRACT:

Please substitute the enclosed Abstract for the one originally filed.

REMARKS

The claims have now been reviewed and amended for clarification, and to conform to U.S. practice. The specification has been given headings, and the Abstract has been revised. No new matter has been added.

It is respectfully submitted the application as amended above is now in condition for substantive examination on the merits. If any claim or other fees are due by this Amendment, please charge our deposit account No. 20-1111.

Respectfully submitted,

Otto Plank, Applicant

Date:

Sept. 6, 2000

By

Richard B. Hoffman

Reg. No. 26,910

Attorney for Applicant

Tilton, Fallon, Lungmus & Chestnut
100 South Wacker Drive, Suite 960
Chicago, Illinois 6060-4002
Telephone: 312/456-8000

ABSTRACT

Method for production of an eyelet, during connection of workpieces where material of an outermost workpiece is pulled through openings in the other workpieces, using a single feed movement of rim hole or eyelet punch to both shape the eyelet from the one workpiece and generate the openings, in the other workpieces by breaking out one or more pieces of materials, providing a reduction in the number of operating steps and simplifying such steps.

09/623865

533 Rec'd PCT/PTO 06 SEP 2000

Attorney Reference
No. PA 29584

Application for
United States Letters Patent
METHOD FOR PRODUCING A RIM HOLE

"Express Mail" mailing label number EL024103075US

Date of Deposit September 6, 2000

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231

Marie Lentz

Inventor:
Otto Plank

(Typed or printed name of person mailing paper or fee)

Marie Lentz
(Signature of person mailing paper or fee)

2/10/01

09/623865
533 Rec'd PCT/PTO 06 SEP 2000

Method for producing a rim hole

The invention refers to a method for producing a rim hole through a pile of at least two plate-shaped work pieces and in which, by means of a rim hole punch basically driven through the pile vertically, material of one plate-shaped work piece facing the rim hole punch is pulled through an opening of the other plate-shaped work piece, whereby the inner contours of the opening basically correspond to the outer contours of the rim hole.

Such methods for producing a rim hole are known from the state of the art. For example, in DE 89 03 243 a piercing is disclosed that connects several machined parts lying on top of each other without a rivet. The machined parts are in that case each provided in a preceding work step with round holes. In doing so, the hole of a machined part lying on the outside is smaller than the holes of the other machined parts. For forming a rim hole, the edge area of the smaller hole of the machined part on the outside that covers the larger holes of the other machined parts is pressed through the holes of the other machined parts. This rim hole protrudes over the outside surface of the other machined part lying on the outside and is subsequently flanged.

A method of the type cited above as a method for joining plates is also known from DE 40 35 210 A1. In the latter, the plates to be connected are likewise punched individually in a previous work step. The plate constituting the rim hole is left unpunched. A rim hole is produced by pressing a clipping punch through work pieces piled against a pressure plate, whereby the material of the unpunched plate is pulled through the pre-drilled holes of the other plates and opens out on the other side of the plates.

In the supplemental application DE 42 02 279 A1 accompanying DE 40 35 210 A1 quoted above, a block punch is additionally used which flanges the spread-outs and thus creates a tight connection.

A disadvantage with known methods is that the machined parts or plates to be

connected must be pre-drilled individually in a separate work step. When drilling is accomplished, a decision must be made whether the machined part or plate in question forms the rim hole, in which case a small drill hole or no drill hole is made, or whether the rim hole is pressed through the machined part or plate in question, in which case larger holes must be made. Such a method is unprofitable due to the extra work steps and due to the different drill holes of the machined parts or plates, depending on intended usage it is cumbersome and prone to error.

In order for the drill holes separately produced in each plate to meet up exactly to produce the rim hole, the sum tolerance of the drill hole position must be kept precisely. For this, however, expensive machinery and trained personnel are required.

It is thus the object of the present invention to reduce the number of work steps in the method for producing a riveted joint, to simplify the various work steps and thus to make the method more profitable.

According to the present invention, the object for a method of the above-mentioned type is solved by having formed in a single feed movement of the rim hole punch both the rim hole as well as the opening on the other rear plate-shaped work piece, seen from the direction of feed of the rim hole punch, by supporting the plate-shaped work piece pointing away from the rim hole punch by a matrix so that when the rim hole punch is driven into the pile from the rear plate-shaped work piece a piece of material is broken out whose outer contours basically correspond to the outer contours of the rim hole.

This solution is simple. Surprisingly, the production of holes of different sizes on the work piece facing the rim hole punch and on the rear work piece (or rear work pieces) can be waived by having - when producing the rim hole - a piece (or pieces) of material broken out of the rear work piece (or work pieces) thus producing an opening that the rim hole largely fits into with its contours. Drilling the holes individually into the work pieces can thus be dispensed with, manufacturing costs of

the process constituting the invention are thus lower than with current state-of-the-art processes, the process is simpler and less prone to error. The process is applicable to any cross-section shapes of the rim hole desired. Of particular practical importance are rim holes with circular cross-section and rim holes in the shape of oblong holes.

In addition, the process for producing the rim hole is made considerably simpler and cheaper because the inventor has, contrary to expectations, succeeded in additionally producing the rim hole simultaneously with the piece of material to be broken out in the course of a single feed movement of the rim hole punch through the pile supported by the matrix.

In an advantageous embodiment, at the end of the rim hole punch feed movement the rim hole can protrude over the rear plate-shaped work piece surface facing the matrix. This makes sense especially if a maximum length of the rim hole is desirable, e.g. as in cutting a thread in the rim hole. In this way too, the rim hole can be processed in additional subsequent process stages.

In an advantageous manner the rim hole protruding over the rear plate-shaped work piece surface facing the matrix is preferably flanged for producing a rim hole riveting by means of a flanging punch applied from a side opposite the work piece, in which case after flanging the outer surfaces of the rim hole at least in certain sections rest on the outer surface of the rear work piece.

In an advantageous embodiment of the invention, prior to formation of the rim hole, a penetration opening can be created through the pile whose cross-section surface corresponds at most to the cross-section surface of the rim hole opening. Such a penetration opening produces a particularly clean rim hole since the rim hole punch is centred and led through the penetration opening. In addition, the rim hole in this embodiment contains less material so that due to less pronounced plastic distortion the rim hole does not break through in places of maximum plastic distortion.

In a further embodiment of the invention, provision can be made for having the penetration opening through the pile produced with an essentially constant cross-section. This facilitates particularly rapid and inexpensive production of the penetration opening.

The number of work steps is reduced optimally by having, in a further advantageous embodiment, the penetration opening produced by the rim hole punch with the feed movement of the rim hole punch while the rim hole and the piece of material are simultaneously formed. Since with this embodiment penetration opening, rim hole and piece of material are produced in a single feed movement of the rim hole punch, production times and manufacturing costs can in this way be drastically reduced.

Here below, two embodiments of the process constituting the invention are described on the basis of drawings by way of example.

The expert is encouraged at this point to determine which non-inventive sub-combinations of features described in the embodiments solve the objective task of achieving the goal of the invention at each stage according to the respective and most obvious state of the art.

Fig 1 shows a first step of a first embodiment of the method constituting the invention for producing a riveted joint.

Fig 2 shows a second step of the first embodiment of the method for producing a riveted joint.

Fig 3 shows a third step of the first embodiment of the method constituting the invention for producing a riveted joint.

Fig 4 shows a fourth step of the first embodiment of the method constituting the invention for producing a riveted joint.

Fig 5 shows a fifth step of the first embodiment of the method constituting the invention for producing a riveted joint.

Fig 6 shows the finished riveted joint as produced by the first embodiment of the method constituting the invention for producing a riveted joint.

Fig 7 shows a first step of the second embodiment of the method constituting the invention for producing a riveted joint.

Fig 8 shows a second step of the second embodiment of the method constituting the invention for producing a riveted joint.

Fig 9 shows a third step of the second embodiment of the method constituting the invention for producing a riveted joint.

Fig 10 shows a fourth step of the second embodiment of the method constituting the invention for producing a riveted joint.

Fig 11 shows a fifth step of the second embodiment of the method constituting the invention for producing a riveted joint.

Fig 12 shows the finished riveted joint as produced according to the second embodiment.

Here below, the first embodiment will be explained on the basis of the schematic figures 1 through 6 showing in each case the work pieces and tools in cross-section.

Fig 1 shows plate-shaped work pieces 1 and 2, of different thickness, piled on top of each other and which are to be joined.

Fig 2 shows how a penetration drilling 3 through work pieces 1, 2 is accomplished by

means of a drill 4 through vertical feed through the pile composed of work pieces 1 and 2. The diameter of the penetration drilling 3 in this embodiment example is constant throughout. Work pieces 1 and 2 are made of steel but can consist, independently from each other, of different metal materials.

In Fig 3, the dynamically balanced rim hole punch 7 is shown consisting of several sections 7a, 7b, 7c and 7d and fed through penetration drilling 3. The phase 7d at the front end of the rim hole punch 7 serves for more easily driving the rim hole punch 7 into the penetration drilling 3. The connecting centring piece 7c centres the rim hole punch 7 in the penetration opening 3. The shaft section 7a has an external diameter corresponding to the internal diameter of the completed riveted joint. This diameter is larger than that of the penetration opening 3. The transition section 7d of the rim hole punch 7 lies between the centring piece 7c and the shaft section 7a. The rim hole punch 7 is fed vertically to work pieces 1 and 2 coaxially to the penetration drilling.

Simultaneously, the dynamically balanced matrix 8 on the opposite side of the pile from rim hole punch 7 is fed such that it supports work piece 2 in the outer range of the circular groove 4.

Fig 4 shows the end of the feed movement of the rim hole punch 7 through work pieces 1 and 2. A piece of material 10 has broken out of work piece 2 and the rim hole 9 formed by work piece 1 extends through the opening thus created (21) in work piece 2. The internal diameter of the rim hole 9 corresponds to the external diameter of the shaft section 7a. The matrix 8 thereby supports work piece 2.

If only one rim hole 9 is to be produced, then the process ends with this step.

After finishing rim hole 9 that is created during the rim hole punch's (7) feed movement shown in Figs 3 and 4, the rim hole 7 is flanged, as is shown in Fig 5. For this, a dynamically balanced flange punch 12 is fed from the side of work piece 2 along the centre line 6 while simultaneously a pressure plate 13 supports the pile on the side of work piece 1. The flange punch 12 has a shape corresponding to the

finished riveted joint. In doing so, the flanged rim hole 9 rests with its outside surface 14 on outer surface 15 of work piece 2.

This is shown a second time in Fig 6 where the finished dynamically balanced riveted joint with the circular shaped opening 50 of the rim hole is shown. Work pieces 1 and 2 are tightly connected to each other by the flanged rim hole 9.

Here below, a second embodiment of the method constituting the invention for producing a rim hole riveting in the shape of an oblong hole is described on the basis of Figs 8 through 12. In doing so, only the differences in relation to the first embodiment will be dealt with in detail. Corresponding parts and devices of the second embodiment bear the same reference symbols as those of the first embodiment. Figs 8 through 12 show the process stages schematically in cross-section.

Fig 7 corresponds to Fig 1, work pieces 1 and 2 are, nonetheless, made of aluminium in the second embodiment.

In Fig 8, a rim hole punch 7 is shown that has been modified contrary to the first embodiment and that is led through work pieces not drilled in this embodiment. Instead of phase 7d, the rim hole punch has a punched section 7e. The punched section 7e produces, during the rim hole punch's (7) feed movement, the penetration opening 3' in an oblong hole shape. The penetration opening 3' serves to prevent the accumulation of too much material in the rim hole 9. If too much material is actually in rim hole 9, then the material must flow particularly strongly. This generally results in a breakthrough of the rim hole and in riveted joints with reduced resistance to strains. During feed with rim hole punch 7, work piece 2 is supported by matrix 8. However, it is also feasible that during production of penetration opening 3', work piece 2 is supported by a smaller matrix located inside matrix 8, so that the edges of the penetration opening 3' break off clean. In this case, the internal diameter of this smaller matrix corresponds approximately to the diameter of penetration opening 3'. The punch cross-section 7e has the shape of an oblong hole as does as well the

cross-section of shaft section 7a and transition section 7d.

In Fig 9, a condition is shown in which the penetration opening 3' has just been created by punch section 7e and in which the centering piece 7c is located in the penetration opening 3'. For producing the penetration opening 3', two further pieces of material (16 and 17) have been created. The piece of material 17 was broken out of work piece 2, the piece of material 16 was broken out of work piece 1 through the punch section 7e of the rim hole punch 7. Matrix 8 supports work piece 2 similarly as in the first embodiment example. In order for matrix 8 to support work piece 2 optimally, its shape corresponds likewise to the shape of an oblong hole.

Fig 10 corresponds to Fig 4 of the first embodiment, Fig 11 likewise corresponding to Fig 5 of the first embodiment.

Fig 12 shows that in the second embodiment in the cross-section the same type of riveted joint is created as in the first embodiment. But the riveted joint nevertheless here has the shape of an oblong hole 51.

Abstract

Method for producing a rim hole.

With previously known riveting methods for joining a pile of plate-shaped work pieces, material of a work piece lying on the outside is pulled through pre-drilled holes of the other work pieces and subsequently the part of the rim hole protruding out over the latter work piece is flanged. A disadvantage with this is that separate pre-drilling of work pieces is complicated and expensive. The new process is supposed to reduce the number of work steps, make the individual work steps easier and thus make the process less expensive and more effective. In addition, the connection is supposed to be accomplished flush to the surface.

According to the invention, in a single feed movement of a rim hole punch, both the rim hole is formed from the one work piece as well as the openings in the other work pieces by breaking out one or more pieces of material.

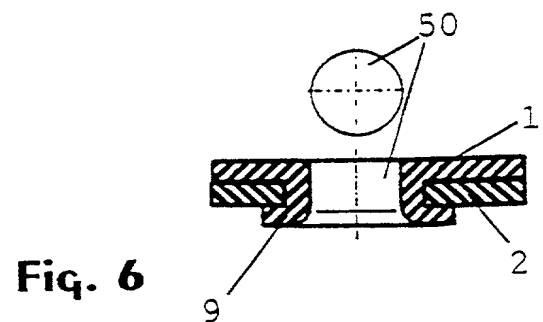
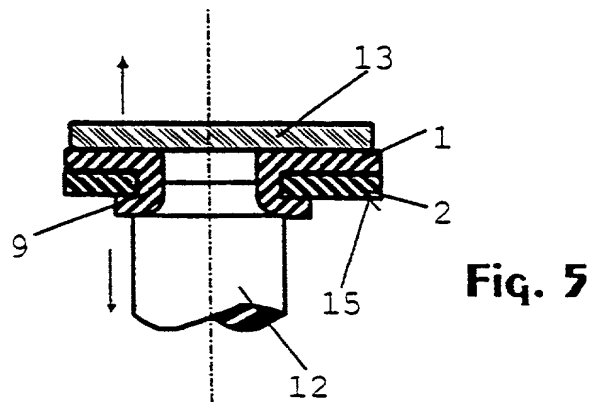
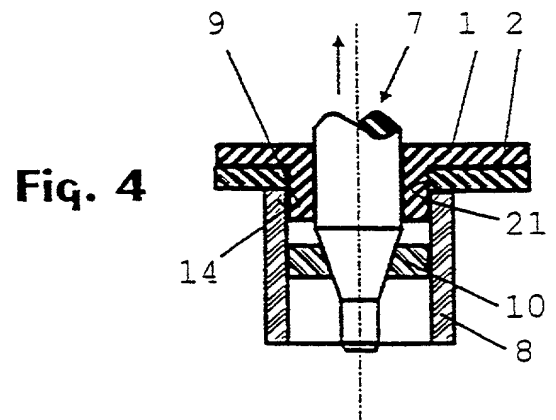
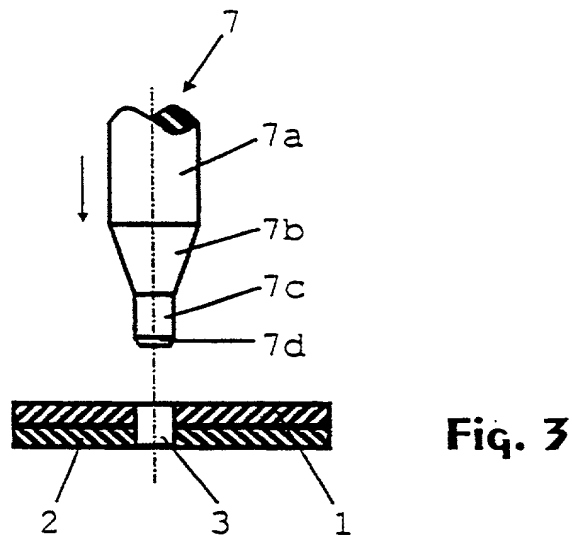
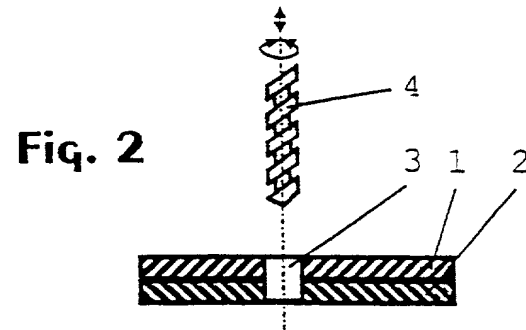
Producing a rim hole.

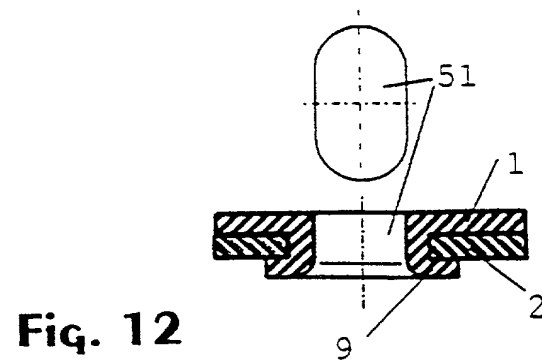
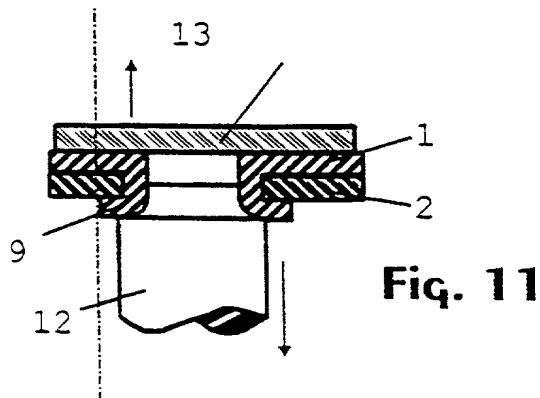
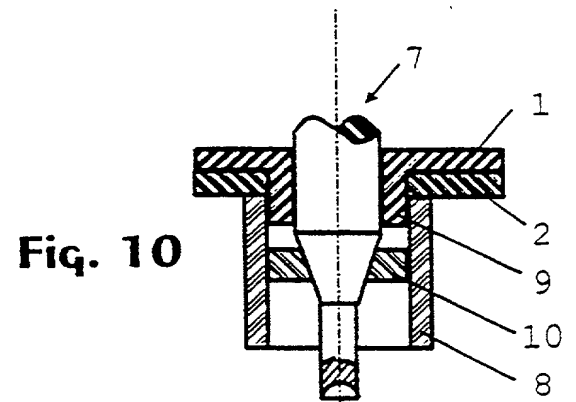
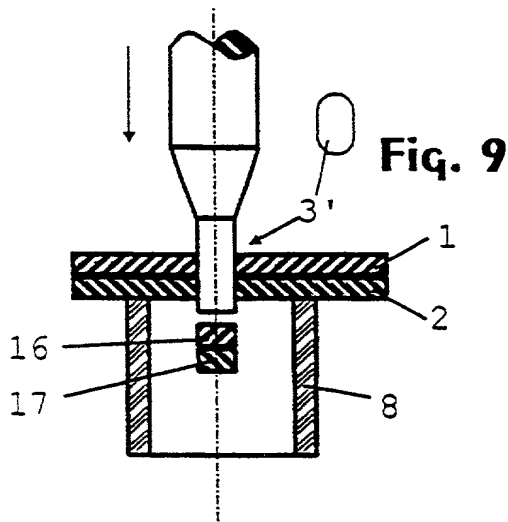
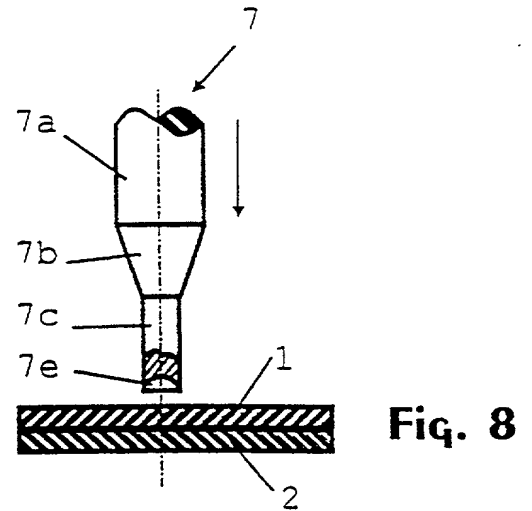
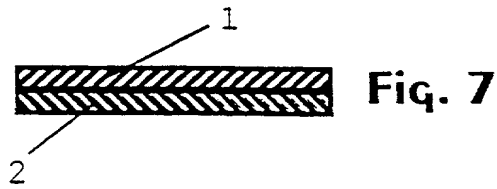
Fig 4

Patent claims

1. Method for producing a rim hole through a pile of at least two plate-shaped work pieces in which by means of a rim hole punch, essentially driven vertically through the pile, material of the one plate-shaped work piece facing the rim hole punch is pushed through an opening of the other plate-shaped work piece whereby the inside contours of the opening essentially correspond to the outer contours of the rim hole, **characterised in that** in a single feed movement of the rim hole punch (7) both the rim hole (9) as well as the opening (21) in the other, rear plate-shaped work piece (2) seen from the direction of feed, are formed by having the plate-shaped work piece (2) pointing away from the rim hole punch supported by a matrix (8) such that when the rim hole punch is driven through the pile (1, 2) a piece of material (10) is broken out of the rear plate-shaped work piece (2) and whose outer contours essentially correspond to the outer contours of the rim hole.
2. Method for producing a rim hole according to Claim 1, **characterised in that** at the end of the feed movement of the rim hole punch (7), the rim hole (9) protrudes over the surface facing matrix (8) of the rear plate-shaped work piece (2).
3. Method for producing a riveted joint according to Claim 2, **characterised in that** the rim hole (7) is preferably flanged by means of a flange punch (12) fed from a side of the work pieces opposite the rim hole punch, whereby, after flanging, the outer surface (14) of the rim hole rests, at least in some sections, on the outer surface (15) of the rear work piece.
4. Method for producing a rim hole according to one of the above cited claims, **characterised in that** prior to formation of the rim hole a penetration opening (3, 3') is created through the pile (1, 2) and whose cross-section surface corresponds at most to the cross-section surface of the opening (50, 51) of the rim hole.

5. Method for producing a rim hole according to one of the above cited claims, **characterised in that** the penetration opening (3, 3') is created through the pile (1, 2) with an essentially constant cross-section.
6. Method for producing a rim hole according to one of the above cited claims, **characterised in that** the penetration opening (3, 3') is created with the feed movement of the rim hole punch by means of the rim hole punch (7) and by which the rim hole (9) and the piece of material (10) are formed.



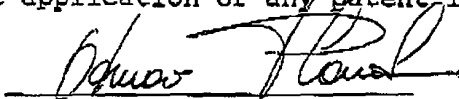


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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

DATE: 2000 10 19



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Re: International Appln. No
PCT/EP99/00217
Filed: January 15, 1999

DECLARATION AND POWER OF ATTORNEY

As below named inventor, I hereby declare that my residence, post office and address and citizenship are as stated below next to my name; I believe that I am the original and first inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

METHOD FOR PRODUCING A RIM HOLE

the specification of which:

 X is attached hereto
 was filed on _____
Application Serial No. _____
and was amended on _____
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification filed herewith, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a). I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

<u>Number</u>	<u>Country</u>	<u>Date Filed</u>	<u>Priority Claimed</u>
198 10 367.0	Germany	March 10, 1998	<u> X </u> YES <u> </u> NO

I hereby appoint as my attorney, with full powers of substitution and revocation, to prosecute this application and transact all business in the Patent and Trademark Office connected therewith:

John B. Lungmus (Reg. No. 18,566), John W. Chestnut (Reg. No. 24,096), Richard B. Hoffman (Reg. No. 26,910), and Jeremy R. Kriegel (Reg. No. 39,257), all of 100 South Wacker Drive, Suite 960, Chicago, Illinois 60606.

Direct all telephone calls to Richard B. Hoffman at Telephone No. (312) 456-8000.

§1.56 Duty to Disclose Information Material to Patentability

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to consideration, or the application becomes abandoned. Information material to the patentability of a claim that is canceled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

- (1) prior art cited in search reports of a foreign patent office in a counterpart application, and
 - (2) the closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentability defines, to make sure that any material information contained therein is disclosed to the Office.
- (b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and
- (1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or
 - (2) It refutes, or is inconsistent with, a position the applicant takes in:
 - (i) Opposing an argument of unpatentability relied on by the Office, or
 - (ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

- (c) Individuals associated with the filing or prosecution of a patent application within the meaning of this specification are:
 - (1) Each inventor named in the application;
 - (2) Each attorney or agent who prepares or prosecutes the application; and
 - (3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.
- (d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.